

CLAIMS:

1. A liquid delivery device suitable for liquid delivery in a body cavity when inserted therein, said comprising or including
- 5 a housing defining a barrel with an outlet,
a piston disposed in said barrel and moveable to reduce the available volume for liquid between said piston and said outlet,
a liquid within said barrel between said outlet and said piston, and
a battery powered electrical circuit disposed in said housing capable of being energised to generate gas or gases confined within said housing yet capable of moving
- 10 said piston along said barrel thereby to express liquid out through said outlet.
2. A device as claimed in claim 1 wherein the battery itself of said electrical circuit emits said gas or gases upon energisation of the electrical circuit by said battery.
3. A device as claimed in claim 1 wherein said electrical circuit defines an electrolysis cell with a hydrogel or electrolyte and the gas issues or gases issue from
- 15 said hydrogel or electrolyte.
4. A device as claimed in claim 2 wherein the battery powered electrical circuit includes a battery of a kind as disclosed in US Patent 5,242,565.
5. A device as claimed in claim 3 wherein said battery powered electrical circuit includes an electrolysis cell of a kind as disclosed in US Patent 5,352,464.
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- 20 6. A device of any one of the preceding claims wherein said electrical circuit provides a continuous rate of gas production by the action of a continuous current to the electrolysis cell or gas emitting battery.
7. A device of any one of claims 1 to 5 wherein said electrical circuit provides a discontinuous rate of gas production by the action of a discontinuous current, as
- 25 provided by a microprocessor, to the electrolysis cell or gas emitting battery.
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8. A device of claim 6 wherein said battery powered electrical circuit provides a continuous rate of gas production dependent upon at least one of the group consisting of
- (a) a selected resistor in series,
- 30 (b) a selected variable resistor and a setting of a desired resistance in series,
- and

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(c) a selected microprocessor to control the current.

9. A device as claimed in claim 7 wherein said battery powered electrical circuit includes a selected microprocessor to control the current to the electrolysis cell or gas emitting cell.

5 10. A device as claimed in any one of the preceding claims wherein the battery powered electrical circuit is one having a known or calibrated profile of gas generation that will lead to a related profile of liquid release from said outlet.

11. A device as claimed in any one of the preceding claims which is an intra vaginal device.

10 12. A device as claimed in claim 11 wherein said housing has associated therewith at least one deployable retention member to enable the retention of the device in the vagina after insertion in the vagina of a target mammal whilst said at least one retention member is not deployable.

15 13. A device as claimed in claim 12 wherein said at least one retention member comprises at least two wings which resiliently deploy once inserted.

14. A device as claimed in any one of the preceding claims wherein said liquid includes progesterone in an appropriate liquid carrier.

15 15. A device as claimed in any one of claims 1 to 10 which is an intra ruminal device.

20 16. A device as claimed in claim 15 wherein said intra ruminal device is retainable in the rumen of a target mammal by means of its density at least up until the depletion of the liquid from said housing or by deployment of at least one retention member.

17. A device as claimed in any one of the preceding claims wherein said liquid includes at least one or more of water, ethanol and benzyl alcohol.

25 18. A device as claimed in any one of the preceding claims wherein said battery powered electrical circuit includes a switch capable of being actuated to immediately or after a delay commence the generation of a gas or gases.

19. A device as claimed in any one of the preceding claims wherein said outlet is provided with a closure capable of being removed, ruptured or dissolved in body fluids.

30 20. A device as claimed in claim 19 wherein said closure is capable of being removed or ruptured under the pressurisation of the liquid within said housing upon

energisation of the battery powered electrical circuit.

21. A device as claimed in any one of the preceding claims wherein said liquid is of a volume of from 5 to 100 mL and said piston is movable within said housing to express substantially all of such liquid from the housing.

5 22. A device of any one of the preceding claims insertable, retainable and removal from the vaginal tract of a target species mammal, there being a conduit or passageway disposed to allow pressure equalisation outside of the device at the innermost and outmost extent of the device in the vaginal tract.

23. A device as claimed in any one of the preceding claims substantially as
10 hereinbefore described with reference to the accompanying drawings.

24. An intra vaginal delivery device comprising or including
a housing defining a barrel with an outlet,
variable geometry vaginal retention means carried by said housing,
a piston disposed in said barrel and moveable to reduce the available volume for
15 liquid between said piston and said outlet,
a progesterone carrying liquid within said barrel between said outlet and said piston, and
a battery powered electrical circuit disposed in said housing capable of being energised to generate gas or gases from the battery of said battery powered electrical
20 circuit, such generated gas or gases being confined within said housing and being capable of moving said piston along said barrel thereby to express liquid out through said outlet

and wherein said battery powered electrical circuit provides a discontinuous or continuous gas production upon initiation of energisation with rate and/or timing
25 dependent upon at least one of the group consisting of

- (a) a selected resistor in series,
- (b) a selected variable resistor and a setting of a desired resistance in series,

and

- (c) a selected microprocessor to control the current.

30 25. An intra vaginal delivery device for a target species mammal comprising or including

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an elongate housing defining a barrel with an outlet at one end (the "outlet end")
a piston disposed in said barrel and moveable towards the outlet end to reduce
the available volume for liquid between said piston and said outlet,

a progesterone including liquid within said barrel between said outlet and said
5 piston, the volume of such liquid being from 5 to 100 mL,

wings dependent from said housing capable of self deployment from a vaginal
tract insertion condition to assume a vaginal tract retention geometry for the target
species mammal,

a battery powered electrical circuit disposed in said housing at the non outlet end
10 region thereof capable of being initialised in order to energise the electrical circuit from
the battery thereof, such battery generating once the electrical circuit is energised at
least one gas confined within said housing, such gas being capable when in sufficient
quantities to move said piston along said barrel thereby to express said liquid out
through said outlet.

15 26. A method of providing an active release of a liquid within a body cavity of
a target species mammal which comprises or includes

locating in such a body cavity a device as claimed in any one of the preceding
claims with said battery powered electrical circuit energised or committed to be
energised.

20 27. A method of delivering an active amount of a progesterone into the vaginal
tract of a target species mammal which comprises or includes

locating a device as claimed in any one of claims 1 to 25 in such tract after
initiation of the device, and

allowing the device to actively express the liquid from said housing under the
25 effect, via said piston, of the gas or gases generated by the energised battery powered
electrical circuit.

28. A method as claimed in claim 27 wherein said method involves removing said
device after a sufficient time of liquid delivery.

29. A method of providing delayed release of a liquid vehicle into a body cavity of
30 a mammal or into a liquid environment which comprises or includes the operative use
of a device of any one of claims 1 to 25.

30. A method as claimed in any one of claims 26 to 29 when performed substantially as hereinbefore described with or without reference to any one or more of the accompanying drawings.

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